UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	Docket No. 72-22-ISFSI
PRIVATE FUEL STORAGE, LLC (Independent Spent Fuel Storage Installation)	)	ASLBP No. 97-732-02-ISFSI
	)	January 9, 2004

STATE OF UTAH'S REQUEST FOR ADMISSION OF LATE-FILED CONTENTION UTAH TT (HI-STORM 100 Steel Shims – Feasibility and Safety)

As part of PFS's latest revised analysis on the impact of an aircraft crash into the HI-STORM 100 storage cask, PFS announced a new storage cask design. The new design, specific only to storage casks to be used at the PFS site, includes the addition of four steel shims between the HI-STORM 100 steel lid shell and the steel inner shell of the overpack (storage cask). Under the previous design proposed by PFS, a gap of approximately 2.25 inches between the lid shell and the overpack inner shell results when the 11.5 ton lid is placed on the overpack body and the lid shell protrudes downward 10.5 inches into the cavity of the overpack.

[REDACTED INFORMATION]

Each of the four shims has a non-specific width of less than 2.25 inches, measures approximately 10.5 inches high, and each has a perimeter circumference of 30 inches. What few details there are about the shims are contained in the safeguards reports filed December 10, 2003 by

PFS in response to the Staff's second Request for Additional Information ("RAI").[1] Therefore, the State is obliged to file this contention under safeguards procedures. However, the State maintains that nothing herein is safeguards material.

The State meets the late-filed factors and, for the reasons stated below, the State requests the Board to admit Contention Utah TT. This contention is supported by the Declaration of Dr. Sami Kilic, attached hereto as Exhibit 2.

CONTENTION UTAH TT, HI-STORM 100 Steel Shims – Feasibility and Safety

> PFS's licensing documents fail to describe or analyze (1) the feasibility of fabricating and installing steel shims with such precision that the previous design gap of approximately 2.25 inches between the HI-STORM 100 lid shell and the inner steel shell of the HI-STORM 100 overpack would be reduced to 1/32 inch; (2) the retrievability of the fuel canister should shims be used; and (3) the radiation dose exposure, including dose to workers, from installation or retrievability operations relating to the shims. As such, PFS has failed to demonstrate that it meets applicable regulations, including 10 CFR §§ 72.24, 72.122, 72.126(a), 72.128(a), 20.1201, and 20.1301.

BASIS:

PFS's newly announced use of shims in the HI-STORM 100 casks system creates three distinct unanalyzed safety concerns and barriers to the use of these shims at the PFS site. First, it will be infeasible for PFS to manufacture and install shims to the precision

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[1]PFS RAI Responses: Introduction and Summary at 3; Response to RAI-2H at 19; RAI Response Attachment 2, *PFS Cask Impact Evaluations*, at 2 and Fig. A2-7, attached hereto as Exhibit 1. In these reports, PFS refers to the "lid shell" as the "lid shield plug." The State received this information on December 11, 2003.

tolerance of 1/32 under canister transfer operations for the PFS site, given the spacing and tolerances of the component parts of the HI-STORM system. Second, the reverse operation for off-site shipment (*i.e.*, fuel retrievability) will also be infeasible even if shims could be installed as the new design proposes. Third, there will be a diminution in radiation control and an increase in radiation exposure to workers, and potentially to the public, during canister transfer operations at the PFS site because of the new design now requiring a uniform space of 1/32 inch around the lid shell.

A. Dimensions of Fabricated Shims

To appreciate the State's concerns about inserting steel shims between the underside edge of the HI-STORM top lid (*i.e.*, lid shell) and the inner steel wall of the HI-STORM overpack, it is necessary first to understand the configuration and allowable tolerances of these HI-STORM cask system components. The lid consists of a five layered "sandwich."[2] Holtec drawings and other documents provide the following dimensional information.[3] The 4" thick steel **lid top plate** is 126" in diameter; on top of this is a ¼" thick steel **shield block ring** with diameters of 64 ½" (inside) and 85½" (outside). Attached to the bottom of the top plate is the **lid shell** which is a 1" thick steel ring, 69" in diameter and 10 ½" wide. The **lid bottom plate** attaches to the lid shell and is made of 1 ¼" thick steel and is 69" in diameter. The space enclosed by the top plate, bottom plate, and the lid shell is filled with 10 ½" of concrete, which forms the **lid shield**. When the lid is installed on the overpack,

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[2] *See* PFS SAR Fig. 1.3-1 (Rev. 12), attached hereto as Exhibit 3.

[3] *See* attached Exhibit 4, Holtec Drawing No. 1495, Sheet 2 (Rev. 9), Sheet 3 (Rev. 7), Sheet 4 (Rev. 8), and Sheet 5 (Rev. 9); and Holtec Bill of Material for HI-STORM (Dwg. 1495, 1561) ("BM-1575").

the lid shell and bottom plate (69" diameter) protrude 10 ½" down into the cavity of the overpack's inner shell. The diameter of the steel inner shell of the overpack is 73 ½". It is the gap between the 69" diameter lid shell and the 73 ½" inner shell of the overpack that PFS claims will be reduced to precisely 1/32" by a new cask design utilizing four steel shims.

PFS says it intends to shim the 4 ½" difference in diameter between the 69" bottom lid plate and the 73 ½" inner overpack wall (*i.e.*, 2 ¼" gap) with steel shims sized "2.25" less the initial 1/32" clearance gap." Exh. 1, Att 2 at 2.[4] The tolerances on the finished dimensions of the components of the HI-STORM system, however, make precision of the gap to 1/32" unattainable. The 69" diameter bottom plate has a tolerance of ± ¼"; the 10 ½" lid shield has a tolerance of ± ⅛"; and the 73½" diameter overpack inner steel wall has a tolerance of + ¼" to -⅛". *See* Exh. 4, Dwg 1495, Sheet 2. There are various welds on the joints and connections of these components. Id. at Sheets 3, 4 and 5. It is apparent that each shim would need to be custom made for each cask system because differences within allowable tolerances in the finished dimension of the inner overpack wall, bottom lid plate, and lid shell will dictate the size of the gap needed to be shimmed for each and every cask at the PFS site. Putting aside welding joints and metal expansion at the 339˚ F operating temperature, and based on allowable tolerances for the bottom plate and inner wall of the overpack, the gap to be shimmed could be as wide as 2 ½" or as narrow as 2 1/16", thereby requiring custom-sized shims if PFS is to realize its claim that only 1/32" gap will remain after shimming. *See* id., Sheet 2. Moreover, it will be difficult, if not impossible, for NRC to

[4]PFS has not specified the exact width of the finished shims and the information it has provided does not allow for computation of the finished width of the shims. *See e.g.*, Exh. 1, PFS RAI Response, at 19 and Att. 2 at 2.

inspect the shims and determine whether they will function as intended or whether they will bind between the surfaces of the lid shell and overpack inner liner, preventing lid removal.

B. Shim Installation During Transfer Operations and Fuel Retrievability

Putting aside whether PFS will be able to manufacture shims that would maintain a spacing of 1/32 inch around a 11.5 ton cask lid, the installation and removal of the lid with the proposed shims cannot be performed using the canister transfer operations at the PFS site, while at the same time meeting prescribed NRC regulations. A brief description of transfer operations follows, but they are more fully described in attached Exhibit 5: PFS SAR Fig. 5.1-1 (Rev. 1) *HI-STORM Canister Transfer Operational Sequence*, and Table 5.1-1 (Rev. 6) *Anticipated Time and Personnel Requirements for HI-STORM Canister Transfer Operations.* A HI-TRAC transfer cask is used to transfer the fuel canister from a HI-STAR shipping cask to a HI-STORM storage cask; the transfer takes place in a transfer bay of the Canister Transfer Building. With the storage and shipping casks sitting side-by-side, the overhead bridge crane or semi-gantry crane uses hooks and trunnions to place the HI-TRAC transfer cask inside the shipping cask, retrieve the fuel canister, move the fuel canister while inside the transfer cask to the storage cask, remove the transfer cask, and finally place the lid on the storage cask. Now that PFS intends to use shims on the lid shell, the question is: how will operators at the PFS site be able to insert the lid shell (essentially a disk 10.5 inches thick with a diameter of nearly 6 feet and weighing 11.5 tons) into the overpack inner shell (a tube with an inside diameter larger than the lid shell by only 1/32 inch around the perimeter) using a crane or otherwise?

The HI-STORM lid weighs 23,000 lbs (11 ½ tons). Holtec FSAR (Rev. 1) Table 3.2.1. Rigging for lifting the lid consists of a four-legged sling. *See* attached Exhibit 6,

Holtec FSAR (Rev. 1), Fig. 8.1.27 *HI-STORM Lid Rigging*. PFS itself has apparently not determined how the shims could be installed and it has not proposed a means of doing so. In fact, the space between the lid shell and the inner shell of the overpack is not accessible because the lid top plate (126 inch diameter) covers the entire inner shell (73.5 inch diameter) as the lid is lowered into place. In any case (and as described below) there will be increased and unanalyzed radiation exposure during lid installation. Whether shims are pre-installed on the lid or whether they will be installed by some other means, the ability of the crane operator to fit the underside of an 11 ½ ton lid measuring 69" in diameter into a clearance of 1/32" and lower this 11 ½ ton object 10 ½" – all the while maintaining a clearance of 1/32" – into the cavity of the overpack is a feat that exceeds the mechanical precision of the crane and its operator. *See* Kilic Declaration ¶¶ 8-9. It is, at the very least, a feat that PFS is required to fully describe. 10 CFR §§ 72.24, 72.126(a), 72.128. Any slight movement of the lid off-center during the operation of lowering the 11 ½ ton lid 10 ½ inches into the overpack cavity will thwart lid installation. Therefore, PFS should also be required to describe how this will be done and how it will deal with a lid if it becomes wedged or bound (*e.g.*, the lid goes off center and is askew in the 1/32" clearance such that the lid cannot be further lowered or raised) during an attempted lid installation. Id.

A further barrier for shim installation and lid fitting is the expansion of metal caused by an increase from ambient to operational temperatures. Moving the HI-TRAC from the HI-STAR to the HI-STORM starts at Step 18 and is completed by Step 24, 3.1 hours later. *See* Exh. 5, PFS SAR (Rev. 1), Table 5.1-1. In Step 25, the HI-STORM lid and lid bolts are

installed (1 hour).[5] Therefore, the fuel canister has been sitting in the storage cask for 2 to 3 hours and the inner shell of the storage cask has begun to heat up while the lid and the shims are still at ambient temperature. Heat will likely cause the metal of the inner overpack wall to change shape and vary in thickness, again raising the impossibility of fabricating the shims to exact dimensions so that the gap will be filled to 1/32". Further, should PFS get the lid into the overpack cavity, the change from ambient temperature to the 339°F operational temperature[6] will cause the 69" diameter steel lid bottom plate to expand significantly. In fact, assuming the thermal expansion coefficient for carbon steel of 6.7 ppm/˚F (12.1 ppm/˚C), an increase in temperature of only 75˚F will cause the 69" diameter lid bottom plate to expand by over 1/32 inch. Kilic Declaration, ¶ 10. If PFS has been able to install the shims, they may be crushed by the expanding steel, making PFS's transfer operations to retrieve the fuel canister (*e.g.*, for off-site shipment in a shipping cask) impossible to perform.[7] Id. If PFS decides to use some type of deformable shims, the same complications arise with removing the lid and retrieving the fuel canister.

PFS must be capable of fuel retrieval. 10 CFR § 72.122(l) ("Storage systems must be designed to allow ready retrieval of spent fuel . . . for further processing or disposal"). The PFS SAR asserts that it meets this criterion. SAR 4.7-1 (Rev. 17). However, this statement was made prior to the use of shims and it no longer stands because PFS has given no consideration to whether it will be possible to remove the lid and has failed to describe how

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[5]Presumably it is at this step 25 that the shims are installed.

[6]Table 4.4.36, HI-STORM FSAR, Rev. 1.

[7]The Certificate of Compliance ("CoC") for the 185 ton HI-STORM storage cask is for storage only – the HI-STORM cask cannot be used for off-site shipment.

it will do so in the necessary reverse transfer operations for off-site shipment if shims are used. Accordingly, PFS does not meet the requirement of 10 CFR § 72.122 (l).

C. Control of Radiation Exposure and Increased Radiation Doses

PFS SAR (Rev. 10) Table 7.4-1, attached hereto as Exhibit 7, describes the estimated personnel exposures for HI-STORM canister transfer operations. As can be seen from Table 7.4-1, the maximum radiation dose exposure to workers occurs at Step 24 during the final steps in separating the HI-TRAC from the HI-STORM and immediately prior to lid installation (step 25). The dose rate in this area is 40 mrem/hour, and 21 mrem/hr. if temporary shielding can be used. Id. An additional step will now be required between Steps 24 and 25 for shim installation.[8] Since precision installation of the lid obviously cannot be performed with a crane[9], PFS may need to have workers perform additional tasks, such as manually controlling and assisting in fitting the 69" diameter 11 ½ ton lid into a clearance space of 1/32". As the lid is not on the overpack at this point, there is a potential dose exposure in this area of at least 21 to 40 mrem/hr. NRC regulations require PFS to analyze dose to workers (10 CFR § 20.1201) and the public (§ 20.1301), to control radiation exposure (§ 72.126(a)), and to ensure safety (§ 72.128) during normal operating conditions. PFS has failed to satisfy the foregoing regulations for shim installation as part of storage

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[8]At this point, the transfer cask has been removed and the fuel canister is exposed in a storage cask without its lid. Id.

[9]To say the operators at PFS can maneuver an 11 ½ ton 69" diameter lid into a hole with a 1/32" clearance by a overhead crane where the uncoiled crane hook is at an elevation of about 170 feet (PFS SAR Fig. 4.7-5 and 6 (Rev. 3)), defies credulity. In responding to this contention, PFS may complain that the State's concerns lack specificity. However, this is PFS's new design for which it has provided scanty details. It will only be possible to be more specific if and when PFS complies with10 CFR §§ 72.24, 72.122, 72.126(a), 72.128(a), 20.1201, and 20.1301.

transfer operations or lid removal as part of off-site shipment operations. The new cask design, specific to these storage casks to be used at the PFS site, creates serious and unanalyzed conditions during normal operations at the PFS ISFSI.

D. A PFS Licensing (not a Generic HI-STORM 100 CoC) Requirement

[REDATED INFORMATION]

It has not been presented as part of or an amendment to Holtec's HI-STORM generic Certificate of Compliance. PFS says that the "great detail that would be involved" for fabrication of the necessary shims and their installation on the shield plug (*i.e.*, lid shell) means that "such information is not included in licensing documents, such as the FSAR . . ." RAI Response at 19 (Exh. 1). PFS wants to shunt off these details to Holtec's fabrication and installation procedures, and whatever they are, PFS says it will commit to them. Id. There are serious flaws in this approach. First, the fabrication and installation of the shims are specific only to the HI-STORM 100 casks to be used at the PFS site. In fact, PFS states: "While meaningful in an impact analysis involving the upper region of the HI-STORM overpack, the shims are insignificant to all other aspects of the HI-STORM system performance . . ." Id. at 3. If the shims are insignificant to all other aspects of the cask's performance, then they cannot be part of the generic HI-STORM design. It is inconceivable that in a competitive industry Holtec would propose to market a storage cask system that requires customers to undertake the impossible feat of installing shims that then create a barrier to fuel retrieval unless those customers could not otherwise meet NRC licensing requirements. PFS is the one customer who fits this mold. Moreover, Holtec has not

amended, and apparently does not intend to amend, its HI-STORM CoC or FSAR to bring the shim fabrication and installation into the generic CoC.

Second, the shims used to fill the gap to 1/32" will vary with each cask to be used at the PFS site because of the allowable tolerances of the finished dimensions of the HI-STORM 100 cask system. The precision needed will require each shim to be custom fitted if there is any chance that PFS, under its transfer operations, could install the lid and still meet applicable NRC regulations.

Third, the use of shims will significantly affect the current analysis in PFS's SAR relating to public and worker radiation dose exposure, control of radiation exposure, safety in transfer operation, and fuel retrievability. Pointing to Holtec's fabrication and installation procedures will not fix these defects in PFS's SAR, and a deficient SAR will not provide a licensing basis sufficient for the Commission to make the required finding under 10 CFR § 72.40.

In sum, the finished dimensions of the shims, their installation, and their effect on fuel retrieval are all part of PFS's licensing demonstration. PFS has failed to demonstrate that it meets applicable regulations, including 10 CFR §§ 72.24, 72.122, 72.126(a), 72.128(a), and 20.1201 and 20.1301. Accordingly, the Board should admit Contention Utah TT.

LATE FILED FACTORS

The State meets the 10 CFR § 2.714(a) late filed factors for Contention Utah TT.

Good Cause: On December 11, 2003 the State received PFS's RAI responses that revealed PFS now intends to shim to 1/32" the space between the HI-STORM lid shell and the inner wall of the overpack. It is a new design feature that the State could not have foreseen and one that, on its face, is infeasible to accomplish within NRC prescribed

regulations. The State, therefore, has good cause for late filing Contention Utah TT.

There is certain minimum information that each application for a Part 72 license must provide. 10 CFR § 74.24. The use of shims is not a mere housekeeping detail; it directly implicates safety and operations at the PFS site, the necessary details of which PFS has failed to provide or analyze. In this instance, PFS has not provided, *inter alia*, a justification for any additions to or departures from the general design criteria (§ 72.24(c)(1)); minimum information on construction material and dimensions of principal SSCs[10] to show that the ISFSI will satisfy the design bases with an adequate margin of safety (§ 72.24(c)(3)); an analysis and evaluation of SSC design and performance to assess impact on public health and safety, including margins of safety during normal operations (§ 72.24(d); with extra operations needed for shim installation and fuel canister retrieval, an analysis of how PFS will meet ALARA[11] and limit and control worker dose to Part 20 limits (§ 72.24(e)); and the technical qualifications of the applicant relevant to operations for shim installation and fuel retrieval (§ 72.24(j)). The State has good cause for filing late because it is PFS's newly conceived design change, specific to casks at the PFS site, that puts PFS in breach of meeting the foregoing regulations. Contention Utah TT is based on issues that create significant and unanalyzed safety concerns and on issues the State could not have raised until it became aware of PFS's design change (*i.e.*, December 11, 2003). The contention, therefore, is timely.

Development of a Sound Record: PFS has provided no details about fabrication

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[10]Structures, systems, and components.

[11]As low as reasonably achievable.

of the shims to the finished dimensions for each cask; it has provided no details of how the shims will be installed under PFS's current transfer operations; it has provided no details about fuel retrievability for off-site shipment; and it has provided no details about the potential increase in radiation dose exposures during operations relating to the shims. Nor has PFS provided analyses relating to these changed normal operating conditions. The State, therefore, is hindered, at this stage, to specifically describe testimony it would file because, after all, it is PFS's responsibility to provide those details. 10 CFR § 72.24. After PFS provides sufficient details, the State is prepared to offer testimony from engineering and radiation dose experts, for example, those experts identified by the State for the Utah K aircraft crash consequences proceeding. The type of testimony the State intends to provide relates to engineering testimony about the finished dimensions of the gap that needs to be shimmed to 1/32", the practicality of fabricating and installing such shims, the effect on PFS's transfer operations, the heat properties of metal, and barriers to removal of the lid (and thus the fuel canister). The focus of radiation dose testimony would be potential exposure to workers and the public during transfer operations.

Availability of Other Means for Protecting the State's Interests: The State has no alternative means, other than this licensing proceeding, to protect its interest. As described above, PFS's recent decision to use shims is not part of the generic CoC for the Holtec HI-STORM cask. In fact, PFS has explicitly stated that Holtec will not provide in CoC licensing documents, such as the Holtec FSAR, fabrication and installation details about the shims. RAI Resp. at 19 (Exh. 1).

Representation by Another Party: The State's position will not be represented by any other party because the State is the only party remaining before the Licensing Board.

Broadening of Issues or Delay of the Proceeding: First, it is PFS who has broadened this proceeding by an eleventh-hour decision to shim a gap between the lid shield and the inner wall of the overpack to 1/32". Second, the admission of Contention Utah TT will broaden the proceeding but it should not unduly delay it. The issues in Contention Utah TT should be able to be accommodated in the existing proceeding relating to Contention Utah K.

CONCLUSION

For the foregoing reasons, Contention Utah TT meets the Commission's standard for late filed contentions and, thus, should be admitted.

DATED this 9th day of January, 2004.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a copy of STATE OF UTAH'S REQUEST FOR ADMISSION OF LATE-FILED CONTENTION UTAH TT (HI-STORM 100 Steel Shims – Feasibility and Safety) was served on the persons listed below by Federal Express, this 9th day of January 2004:

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